

Claims

What is claimed is:

- 1 **1.** A power system (8) for providing uninterrupted
2 electric power to a critical load (14), comprising:
 - 3 a. a first power source (10) providing sufficient
4 power to supply the critical load (14);
 - 5 b. a second power source (18) comprising at least
6 one fuel cell power plant (18), the second power
7 source providing sufficient power to supply the
8 critical load (14) and adapted to be normally
9 substantially continuously connected and providing
10 power to, the critical load (14);
 - 11 c. a static switch (19) for selectively
12 connecting and disconnecting the first power source
13 (10) to the second power source (18) and (to) the
14 critical load (14); and
 - 15 d. a switch controller (49, 45)for controlling
16 the state of the static switch (19) to connect the
17 first power source (10) with the critical load (14)
18 and the second power source (18) during normal
19 operation of the first power source (10) and to rapidly
20 disconnect the first power source (10) from the
21 critical load (14) and the second power source (18)if
22 and when operation of the first power source (10)
23 deviates beyond a limit from normal.
- 1 **2.** The power system (8) of claim 1 wherein the switch
2 controller (49, 45) additionally controls the state of
3 the static switch (19) to rapidly reconnect the first
4 power source (10) with the critical load (14) and the
5 second power source (18) when the first power source
6 (10) returns to normal operation.

1 **3.**The power system (8) of claim 1 wherein the second
2 power source (18) comprises only one or more fuel cell
3 power plants (18).

1 **4.**The power system (8) of claim 1 wherein the static
2 switch (19) is a solid-state device.

1 **5.**The power system (8) of claim 4 wherein the solid-
2 state device is a thyristor (19).

1 **6.**The power system (8) of claim 1 wherein the first
2 power source (10) is a utility power grid and wherein
3 each fuel cell power plant (18) includes a power
4 conditioning system (PCS) for configuring operation of
5 the respective fuel cell (18) in a grid connected mode
6 or in a grid independent mode in response to mode
7 control signals (D1/401', D2/402'), and including a
8 site management controller (31) connected intermediate
9 the switch controller (49, 45) and the power
10 conditioning system (PCS) and responsive to preliminary
11 mode signals (M1/401, M2/402) from the switch
12 controller (49, 45) for providing the mode control
13 signals (D1/401', D2/402') to the fuel cell power
14 conditioning system (PCS), whereby the fuel cell power
15 plants (18) rapidly transition operation between the
16 grid connected and the grid independent modes.

1 **7.**The power system of claim 6 wherein the rapid
2 disconnection of the first power source (10) from the
3 critical load (14) and the second power source (18),
4 and the rapid transitioning of operation of the at
5 least one fuel cell (18) between the grid connected
6 mode and the grid independent mode occurs within an
7 interval of about 4 milliseconds.

1 **8.**The power system of claim **1** wherein the rapid
 2 disconnection of the first power source (**10**) from the
 3 critical load (**14**) and the second power source (**18**)
 4 occurs within an interval of about 4 milliseconds.

1 **9.**A power system (**8**) for providing substantially
 2 continuous electric power to at least a critical load
 3 (**14**), comprising:

- 4 a. a utility grid power source (**10**) providing
 5 sufficient power to supply the critical load (**14**);
- 6 b. at least one fuel cell power plant (**18**)
 7 operating substantially continuously for providing at
 8 least sufficient power to supply the critical load
 9 (**14**), the at least one fuel cell power plant (**18**)
 10 including a power conditioning system (**PCS**) for
 11 configuring operation of the respective fuel cell (**18**)
 12 in a grid connected mode or in a grid independent mode
 13 in response to mode control signals (**D1/401'**, **D2/402'**),
 14 the at least one fuel cell power plant (**18**) being
 15 normally substantially continuously connected and
 16 providing power to, the critical load (**14**);
- 17 c. a static switch (**19**) for selectively
 18 connecting and disconnecting the grid power source (**10**)
 19 to the at least one fuel cell power plant (**18**) and to
 20 the critical load (**14**);
- 21 d. a switch controller (**49, 45**) for controlling
 22 the state of the static switch (**19**) to connect the grid
 23 power source (**10**) with the critical load (**14**) and the
 24 at least one fuel cell power plant (**18**) during normal
 25 operation of the grid power source (**10**) and to
 26 disconnect, within a 4 millisecond interval, the grid
 27 power source (**10**) from the critical load (**14**) and the

28 at least one fuel cell power plant (18) when the grid
29 power source deviates beyond a limit from normal; and
30 e. a site management controller (31) connected
31 between the switch controller (49, 45) and the power
32 conditioning system (PCS) and responsive to preliminary
33 mode signals (M1/401, M2/402) from the switch
34 controller (49, 45) for providing the mode control
35 signals (D1/401', D2/402') to the fuel cell power
36 conditioning system (PCS) to cause the at least one
37 fuel cell power plant (18) to rapidly transition
38 operation, within a 4 millisecond interval, between the
39 grid connected mode and the grid independent mode.